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CLAIMS

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1. A blood treatment device having a blood purification element (1), divided into two chambers by a semipermeable membrane (2), whose first chamber (3) is part of a dialysis fluid loop and whose second chamber (4) is part of an extracorporeal blood loop,

having a dialysis fluid supply line for supplying fresh dialysis fluid to the first chamber (3) and/or into the blood loop,

having a dialysis removal line for removing used dialysis fluid from the first chamber (3),

having a control unit (34) for controlling the blood treatment device,

having an analysis unit (33),

having at least one sensor (27, 28), connected to the analysis unit (33), on at least one of the blood loop or dialysis fluid loop to detect the concentration of a first material which may penetrate the semipermeable membrane (2),

the analysis unit (33) being capable of determining the blood purification performance L1 of the blood purification element for the first material on the basis of the measurement values of the at least one sensor (27, 28),

characterized in that

the analysis unit (33) is also capable of determining the blood purification performance L2

of the blood purification element for a second material, which is different from the blood purification performance  $L_1$  for the first material, on the basis of the blood purification performance  $L_1$  for the first material.

2. The blood treatment device according to Claim 1, characterized in that the blood purification performance  $L$  is the effective dialysis  $Deff$ .
3. The blood treatment device according to Claim 2, characterized in that the analysis unit (33) is capable of deriving an effective mass exchange coefficient  $k_{0A1eff}$  from the measured dialysance  $D1eff$  for the first material, of determining the effective mass exchange coefficient  $k_{0A2eff}$  for the second material from the stored ratio  $f$  between the theoretical mass exchange coefficient  $k_{0A2th}$  of the second material and the theoretical mass exchange coefficient  $k_{0A1th}$  of the first material by multiplying with  $k_{0A1eff}$ , and of deriving the effective dialysance  $D2eff$  for the second material from  $k_{0A2eff}$ .
4. The blood treatment device according to Claim 2, characterized in that the analysis unit (33) is capable of deriving, from the stored theoretical mass exchange coefficients  $k_{0A1th}$  for the first material and  $k_{0A2th}$  for the second material, values corresponding thereto for the theoretical dialysances  $D1th$  and  $D2th$  and of determining the effective dialysance  $D2eff$  for the second material from the measured dialysance  $D1eff$  for the first material multiplied by the ratio  $D2th$  to  $D1th$ .
5. The blood treatment device according to one of the preceding claims, characterized in that the at

least one sensor is a first upstream sensor (28) on the dialysis fluid removal line (8a) for measuring the concentration of the first material in the used dialysis fluid.

6. The blood treatment device according to Claim 5, characterized in that it also includes a dialysis fluid preparation unit (11), which is connected to the control unit (34).
7. The blood treatment device according to Claim 6, characterized in that the analysis unit (33) and the control unit (34) are capable of determining the blood purification performance  $L_1$  for the first material through the following method:

storage of the concentration  $C_{ld1}$  of the first material in the fresh dialysis fluid in the analysis unit (33),

measurement of the concentration  $C_{ldo1}$  of the first material in the used dialysis fluid using the first downstream sensor (28) and storage of  $C_{ldo1}$  in the analysis unit (33),

alteration of the concentration  $C_{ldi}$  of the first material in the fresh dialysis fluid by the dialysis fluid preparation unit (11) at the command of the control unit (34),

storage of the changed concentration  $C_{ldi2}$  of the first material in the fresh dialysis fluid in the analysis unit (33),

measurement of the changed concentration  $C_{ldo2}$  of the first material in the used dialysis fluid

using the first downstream sensor (28) and storage of Cldo2 in the analysis unit (33), and

determination by the analysis unit (33) of the blood purification performance L1 on the basis of the concentrations Cldi1, Cldo1 and changed concentrations Cldi2, Cldo2 of the first material in the fresh and used dialysis fluid.

8. The blood treatment device according to Claim 7, characterized in that the dialysis fluid preparation unit (11) performs the change of the concentration Cldi in the form of a step or bolus.
9. The blood treatment device according to Claim 7, characterized in that it also includes a first upstream sensor (27), connected to the analysis unit (33) and placed on the dialysis fluid supply line (7b), for measuring the concentrations Cldi1 and Cldi2 in the fresh dialysis fluid.
10. The blood treatment device according to one of the preceding claims, characterized in that it also includes a second downstream sensor (48), connected to the analysis unit (33) and placed on the dialysis fluid removal line (8a), for measuring the concentration C2do of the second material in the used dialysis fluid.
11. The blood treatment device according to Claim 10, characterized in that the analysis unit (33) is capable of determining the concentration C2bi of the second material in the blood flowing to the second chamber (4) on the basis of the measured concentration C2do of the second material in the used dialysis fluid and the stored concentration C2di of the second material in the fresh dialysis

fluid and the established blood purification performance L2 of the second material.

12. The blood treatment device according to one of the preceding claims, characterized in that the first material is sodium.
13. The blood treatment device according to one of the preceding claims, characterized in that the second material is potassium, glucose, creatinine, calcium, or phosphate.